CHARLES UNIVERSITY IN PRAGUE

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CURRENT STATUS AND FUTURE PERSPECTIVES OF THE NUMBER AND STRUCTURE OF PRIMARY HEALTH CARE PHYSICIANS IN THE CZECH REPUBLIC

Synopsis of Ph.D. Thesis

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Introduction, definition of the problem studied, data resources

Demographic aging of physicians in the Czech Republic has recently become a frequently discussed issue, especially in connection with the reduction of availability of needed medical care. Most discussed aspects are primary health care, while this debate is rather on the pages of daily newspapers than among the interested institutions. This illustrates the fact that currently there are no studies or conceptual material for the issues of demographic aging of doctors examined. And this was also the reason which became one of the impulses that led to the elaboration of this theme.

Primary health care has had throughout the whole health system a very crucial position, despite the fact that its definition goes back to the end of the seventies of the last century (WHO conference in Alma-Ata in 1978). Neverthelles, the primary health care has still been waiting for an embodiment into the Czech legislation. It is the care that should be the primary point of contact between a patient and the health care system, which requires a specific ability from the primary care physicians. Among the providers of primary health care, in addition to general practitioners and dentists, there also belong e.g. medical first aid, pharmacy emergency service or home care agencies. In the presented thesis, only doctors from four main branches are being analyzed: general practical medicine, practical medicine for children and youth, gynaecology and obstetrics and dentistry. The aim was to:

a) evaluate the manpower and the age structure of these fields of activity of physicians in the period 2000–2007, both at national and regional levels,
b) analyze the movement of doctors in primary health care system, both natural and mechanical,
c) build models that would adequately express the intensity of input and output units according to the age in the reference system,
d) build model projections of the future development and structure of primary care physicians up to 2040, regarding certain entry assumptions, again both at national and regional levels.

To understand this problem more properly, it was necessary to describe sufficiently those factors that most affect the issue of the availability of primary

health care – primarily the population development in the last twenty years, including an analysis of regional disparities and evaluation of the population health status, but also the issue of functioning of the health system in the Czech Republic, including important economical questions.

This work is mainly working with the data sorted out from the Registry of Physicians, Dentists and Pharmacists from the Institute for Health Information and Statistics of the Czech Republic (IHIS CR), according to the type that takes into account the main activity of a doctor. Furthermore, it was the data primarily sorted out from the databases of the Czech Medical Chamber and the Czech Dental Chamber, and also data from the population register of the Czech Statistical Office. Many other data resources are described continuously in the text of the thesis. As an initial forecast of the population that has been used for model projections of future changes in the number and structure of primary care physicians, the projection of the Czech Statistical Office was selected, both for the whole Czech Republic from 2009 onwards, and for the individual regions from early 2010.

Main results of the work

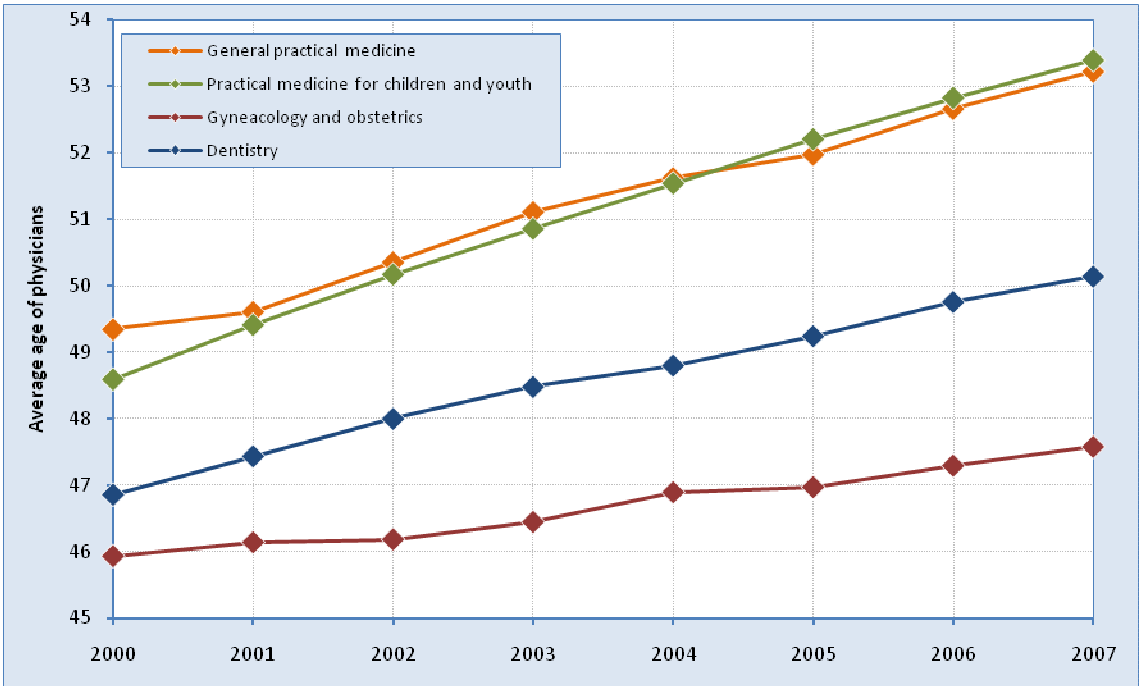
Manpower and the age structure of physicians in primary health care

The most commonly used indicator for evaluating the number of physicians in primary health care is the number of physicians per 100 thousand inhabitants. This indicator bears quite a lot of problems causing lack of objectivity (e.g. paediatricians do not apply to people in childhood, but in total, as well as for gynaecologists). Nevertheless, it is used in a wide range of both international benchmarking, and analysis within a country. Another problem is that the evaluation of regional differentiation of the provision of certain types of health care ignores the specificity of the branch of activity, where there are branches which are concentrated in regional centres at the expense of neighbourhoods. In primary health care this is clearly visible at the gynaecologists and obstetricians and dentists, when many residents in the suburban areas have their doctors in the cities of regional importance, which are often also place of their work, rather than their place of residence. Due to these

facts, availability of primary care is not necessarily affected, although it might be obvious at first sight.

Despite all the mentioned problems, this indicator was used for tentative assessment of the availability of primary health care branches. From the results of regional analysis, based on 2000–2007 data, it can be stated that the number of doctors in this period was more or less stable, but there can be observed a slight decrease of doctors especially in practical branches for adults and for children and adolescents. Regional disparities were mostly caused by the specificity of the branches rather than by the lack of doctors in the area. Generally said, the question of the availability of primary health care in the Czech Republic in the period 2000–2007 was relatively satisfactory, slightly worse conditions could be monitored on the Northwest frontier.

Figure 1 – Development of the average age of physicians in primary care according to individual expertise, CR, 2000–2007

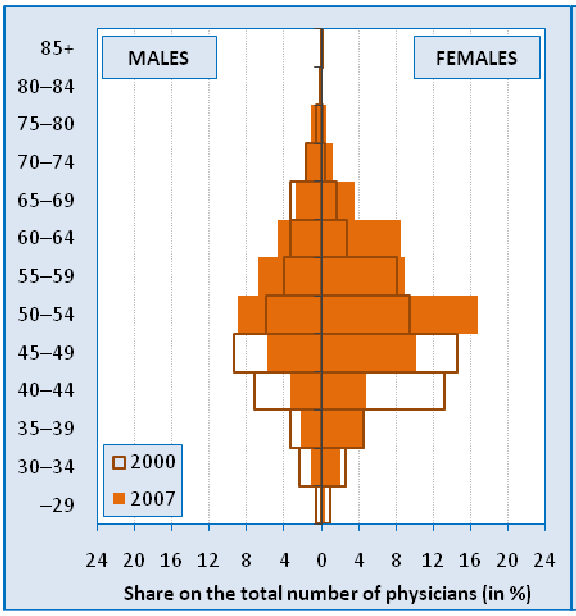


Source: IHIS CR, 2009, own calculations

However, the total numbers do not reveal the age structures of these doctors. A high number of doctors aged 50–60, as a result of the state political arrangement in the 70s of the last century, along with the current low number of graduates who decide to pursue the profession in primary health care, give the age structures very regressive character, across regions. The best starting position is held by the branch of gynaecology and obstetrics, which enjoyed a relatively high popularity among young doctors in several past years. Conversely, dentistry,

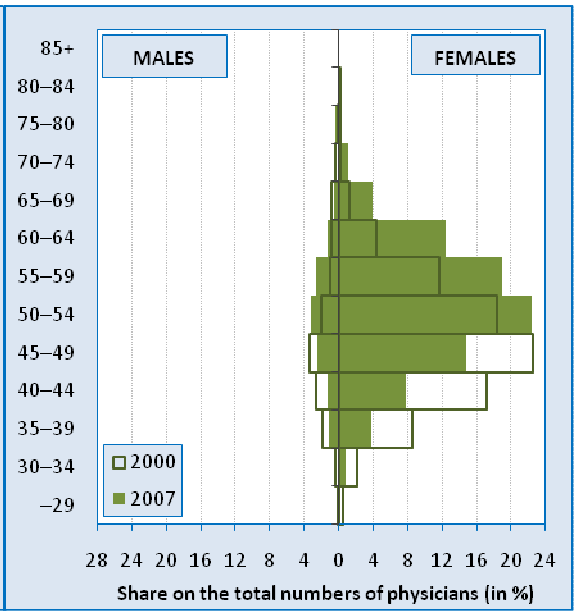
general practical medicine, and especially the practice of medicine for children and youth are faced with a very low number of graduates. The first look at the age structure shows that in the near future there will be a significant decline in the number of physicians in these fields of activity.

Figure 2 – Comparison of age distribution of physicians in general practical medicine, CR 2000 and 2007, end of the year



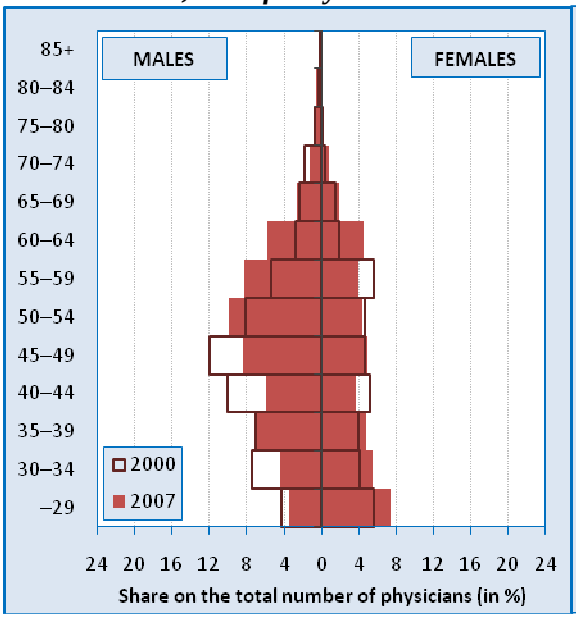
Source: IHIS CR, 2009, own calculations

Figure 3 – Comparison of age distribution of physicians in practical medicine for children and youth, CR, 2000 and 2007, end of the year



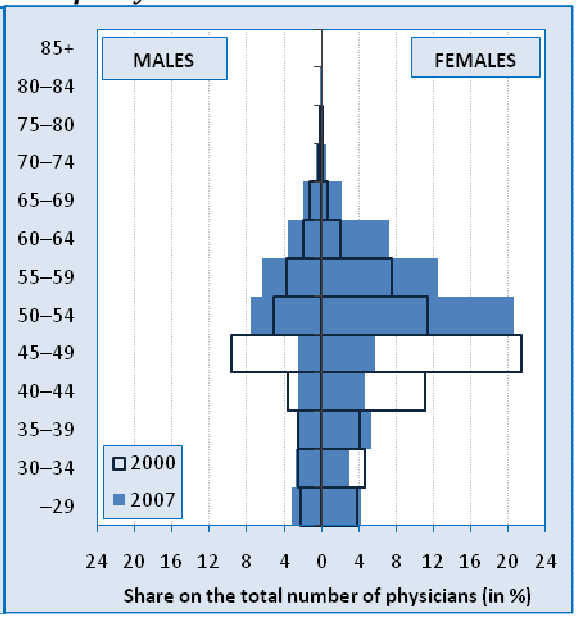
Source: IHIS CR, 2009, own calculations

Figure 4 – Comparison of age distribution of physicians in gynaecology and obstetrics, CR, 2000 and 2007, end of the year



Source: IHIS CR, 2009, own calculations

Figure 5 – Comparison of age distribution of physicians in dentistry, CR, 2000 and 2007, end of the year



Source: IHIS CR, 2009, own calculations

Analysis of the movement of doctors in the health system and the compilation of input models

Doctors, as well as other specific groups of people, could be defined as a separate population in which individuals enter and turn away. Likewise in the standard human populations defined in the population of a given area, in the population of physicians we can encounter newcomers who enter the system either naturally, when they are graduates from domestic medical schools (i.e., imaginary "birth" of individuals), or may come from a different population of physicians (e.g., from abroad or from another region), i.e. a mechanical way that can be identified with immigration. On the side of departures (outputs from the system), there can be seen natural and mechanical movements, too. Mechanical movement can be equated with the labour emigration, defined both geographically (the migration of doctors for work across the boundaries of certain administrative units), and within each sector (leaving the medical profession and the transition to another kind of work), which may act as temporary as well as permanent departures. Natural departures from the system concern the irreversible, respectively demographic final events, which is death, or other natural processes, mostly the end of the profession through retirement. All these moves in the whole system are extremely complicated, particularly with regard to the necessary detailed data base, which is often lacking in the Czech Republic.

In the nineties there was a decrease in the number of students, at both basic medical degree programs – general medicine and dentistry. In recent years, there is an increase of the numbers of students and also the graduates, but mainly thanks to the increased interest of foreign students. Furthermore, the primary health care is among the graduates, who make a decision about the further specialization of their education, less popular than other health sectors. Therefore, despite the overall increase in graduates from the faculties, there was a decline of new entrants into the medical fields of primary health care. When comparing the "real" and "theoretical" values (see more explanations in the thesis), it should be concluded that the current number of new physicians in certain sectors is up to two thirds lower than it could be expected in the whole health system due to the distribution of human resources. Moreover, not all graduates who choose to specialize in fields of primary health care, always successfully conclude the additional specialized training by attestation (Table 1).

Table 1 – Comparison of "real" and "theoretical" number of entrants in each branch of activity of primary health care and the number of granted attestation

Branches	Annual average for period				
	2001–2004		2005–2007		2006–09
	real	theoretical	real	theoretical	attestations
General practical medicine	65	189	59	172	53
Practical medicine for children and youth	29	76	19	72	3
Gynaecology and obstetrics	60	83	48	79	31
Dentistry	126	165	136	160	..
Total	280	513	262	483	
– the proportion of woman	63 %	57 %	70 %	61 %	..

Source: IHIS CR, 2009, Postgraduate Medical Institute, 2010.

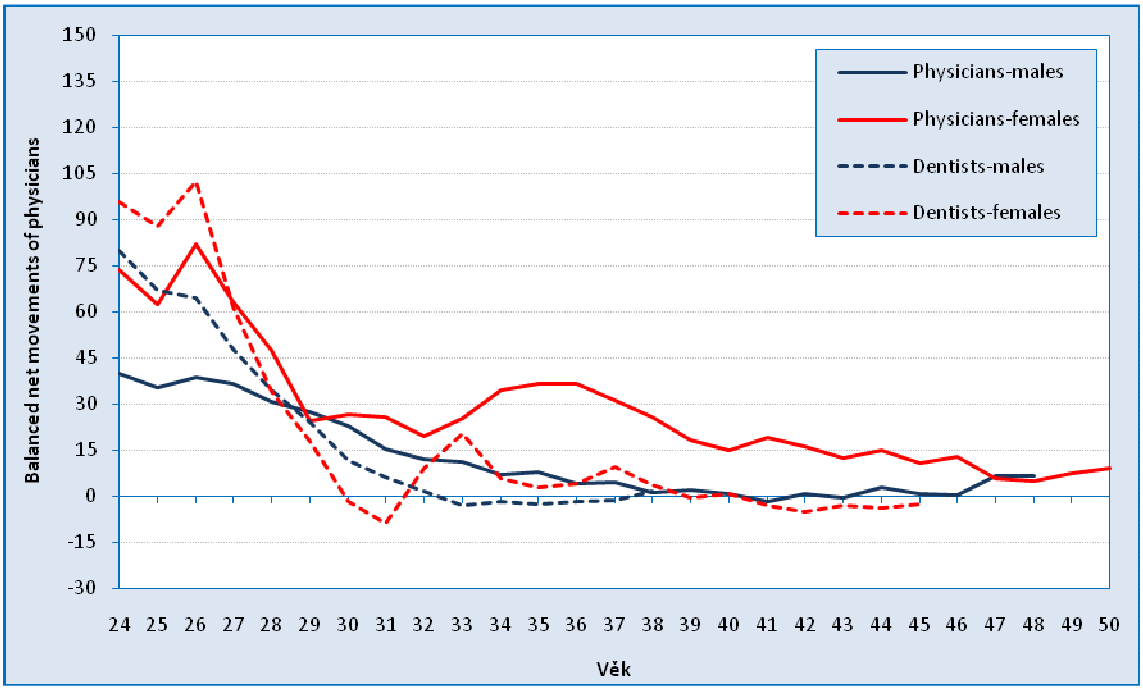
Completion of medical practice by the natural motion can be a double way, either by death or ending of practice, primarily due to retirement. Unfortunately, detailed data that would differentiate this leave is not available. However, it is necessary to keep in mind that the numbers leaving by the natural motion will – with regard to the large generation aged 50–60 years – rise quite significantly in the following years.

Regarding the mechanical movement, primary health care in the Czech Republic is not influenced by doctors´ migration. It is due to mainly two reasons. The first is the language barrier, where there is assumed a perfect knowledge of the language by the primary physicians in the country where they operate. The second reason is the economic factor, when many practitioners have built their own offices, which they do not want to leave now. Thus, even though on average 300 doctors from abroad come annually to the Czech Republic and on the contrary, about 250 doctors per year could theoretically emigrate (based on registration of certificates of professional integrity, professional associations issued by physicians at their request – not all doctors, however, actually leave for abroad after the issuance of the certificate), the primary health care is almost unaffected by this move. If, however, it could be speculated in certain basic features, it can be assumed, that there could be outweigh the positive migration balance, mainly by doctors from Slovakia, whose language barrier for the performance of primary medical profession in the Czech Republic is largely eliminated.

Problems with the evidence of inputs and outputs led to creating some models that would adequately generalize the intensity of inputs/output by age in the field of primary health care system. For this purpose, the four business segments assembled two groups – doctors and dentists, who were studied separately by

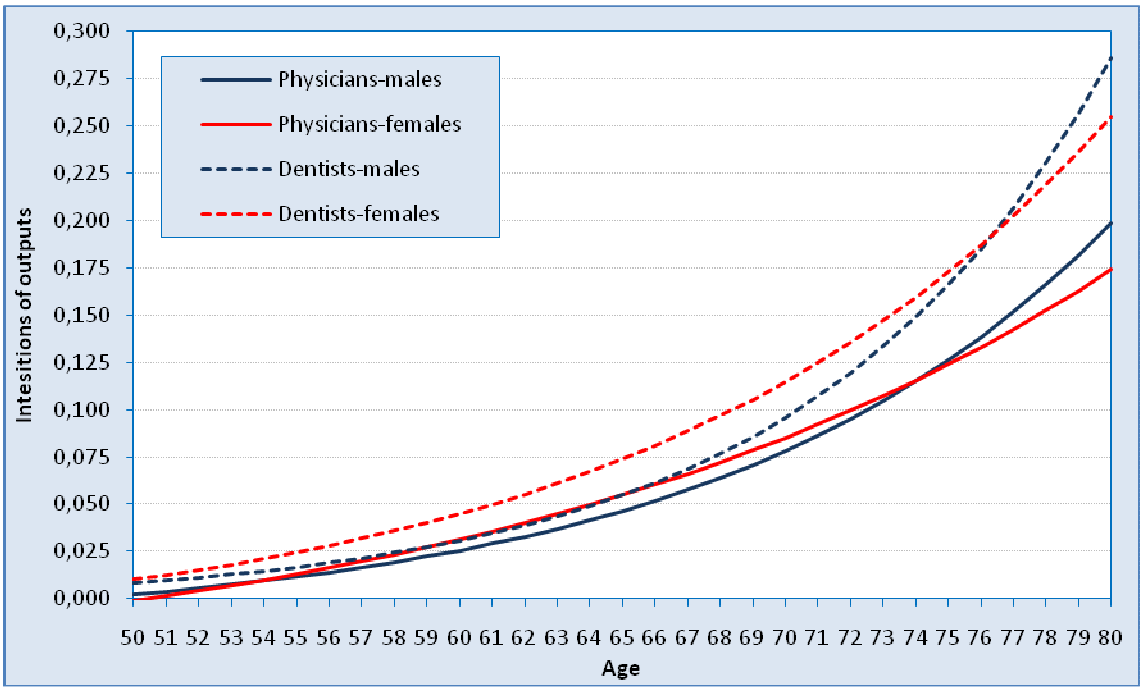
sex. For these four resulting groups, it was then necessary to divide the total age-range into two parts – the period of prevailing entry and the period of prevailing output, while the age that divides these periods was termed as "borderline age". The period of prevailing entry was then treated with further analysis as the 'migration balance' and the prevailing output as the process of mortality. Fluctuating input values in the two periods for all four observed groups were necessary to generalize, by smoothing out the curves of intensity of inputs/outputs. For the period relating to the entry there was used the statistical software SAS to smooth the curves, which allowes combining different types of smoothing and thus finding the manner that is statistically most significant.

Figure 6 – Balanced curves of the movement of doctors using the combined models in the entry relating to the period studied by the groups, the Czech Republic, average 2000–2007



To smooth out the rate of outputs from the system, there was used the Gompertz-Mackeham function (King-Hardy method), which is often used in demographic analysis for smoothing out the curve of mortality in the middle and higher age.

Figure 7 – Comparison of smoothed curves of the output of doctors aged 50–80, according to the two groups and by sex



These generalized model inputs and outputs, and the possibility of further changes over time due to different variables, then allow the estimation of future trends in the number and structure of the primary care physicians for all four monitored fields of activity.

Perspectives of development of the number and structure of primary care physicians

To estimation of the future trends in the number and demographic structure of practitioners in particular branches of activity in the primary health care, it has been approached as to the model projections, i.e. to show how the number and structure of doctors will be developed under predetermined entry conditions. There were created five model scenarios within the whole country. Some of them have been subsequently used also for various regions of the Czech Republic: *a model maintaining the current number of entrants into the system* and *optimal model for future development*. The first mentioned model (Tables 2 and 3, known as "Model 1") applied to future estimated annual number of entrants, which were recorded in 2005–2007 (see Table 1 – "Real" numbers), and further assumes zero net migration and stable intensity of outputs by age

until the end of the projected period (2040). On the other hand, the second model tries to outline a possible development of the structure and future number of doctors, if the number of graduates began to rise gradually and also with presumption of the marginal increase of new entrants due to positive net migration. It also foresaw a gradual reduction in output intensity due to large extension of the retirement pension.

Not only these two models, but also other model scenarios highlighted the fact that demographic aging of physicians is an unavoidable process. There is no time to solve the question how to avoid this process now, but how to mitigate the adverse effects brought by this process. These impacts would then take effect mainly on the overall deterioration of the availability, and thus of the quality of health care.

Table 2 – Comparison of estimated number of physicians in each branch of activity of the primary health care by selected model scenarios, Czech Republic, 2008–2040

Model	2008	2015	2020	2025	2030	2035	2040
	General practical medicine						
Model 1	5,172	4,782	4,326	3,785	3,244	2,795	2,494
Model 5	5,172	4,900	4,677	4,498	4,403	4,401	4,501
	Practical medicine for children and youth						
Model 1	2,140	1,959	1,730	1,452	1,177	955	811
Model 5	2,140	1,985	1,863	1,745	1,647	1,586	1,576
	Gynaecology and obstetrics						
Model 1	2,386	2,453	2,450	2,408	2,343	2,266	2,182
Model 5	2,386	2,476	2,561	2,633	2,673	2,689	2,686
	Dentistry						
Model 1	6,685	6,582	6,270	5,880	5,559	5,418	5,451
Model 5	6,685	6,931	7,010	7,038	7,080	7,206	7,439

Note: Model 1 = model maintaining the current number of entrants into the system, Model 5 = optimal model for future development.

Numerically, strong shift of generations of physicians who are today at higher age, will result in the next 10–20 years in the increase of the proportion of working senior doctors, and in some areas up to 40–50 % of all physicians, even provided that the output intensity by age remains constant. Although it seems unrealistic to share this future view, it must be considered that without the involvement of doctors in the senior age, it would lead, primarily in the areas of general practice medicine and the practice of medicine for children and youth, to a dramatic decline of their total numbers.

Table 3 – Comparison of estimated proportion of physicians aged 65 or more out of all physicians in a given field of activity of primary health care according to selected model scenarios, Czech Republic, 2008–2040 (in %)

Model	2008	2015	2020	2025	2030	2035	2040
	General practical medicine						
Model 1	11.1	19.5	30.0	41.4	39.3	34.4	29.0
Model 5	11.1	20.6	32.4	43.8	40.4	33.6	26.5
	Practical medicine for children and youth						
Model 1	6.8	20.2	34.7	46.5	49.6	42.0	32.6
Model 5	6.8	21.7	38.3	50.3	50.8	41.0	29.9
	Gynaecology and obstetrics						
Model 1	8.0	13.5	17.6	20.3	19.8	19.3	20.7
Model 5	8.0	14.3	19.3	22.7	22.8	22.5	23.8
	Dentistry						
Model 1	5.6	13.6	26.5	27.2	18.7	13.1	10.5
Model 5	5.6	13.4	26.4	28.3	21.4	16.1	12.7

Note: Model 1 = model maintaining the current number of entrants into the system, Model 5 = optimal model for future development.

However, the whole problem of the aging has also another dimension, which is not only the demographic ageing of physicians, but also the ageing of the whole population. With the increasing age of a patient, there is an increase of the financial demands to the patient care, which means also a higher number of contacts between a doctor and a patient. The thesis documented this problem at the level of the Czech Republic, as well as at the level of individual regions; this problem is pointed out on the example of two branches of "practical medicine". One of the outcomes for the model of optimal future development is that the number of contacts between a doctor and a patient would increase by about 15–40% in 2020.

The detailed results for national and regional estimates of future developments, according to the model scenarios, can be found in electronic addendum of the Ph.D. thesis (CD-ROM).

Conclusions and recommendations

The main results from the analysis of current status and estimated future number and structure of primary care physicians could be summarized into several points:

- The location of physicians in primary health care is quite uneven. This inequality is primarily given by the character of each branch of activity. It can be assumed then that the current distribution of physicians in primary health care is largely compliant.
- The current age structure of physicians in primary care is highly unbalanced due to the large number of doctors at higher age and the low number of physicians at the youngest age groups. Most consistent structure from the field of primary branches of activities is in gynaecology and obstetrics, while the largest discrepancy between the main age groups can be monitored by practical medicine for children and youth. Within each region, the differences are not significant; it indicates a relatively large impact of demographic developments across all regions of the Czech Republic.
- The Czech Republic is struggling with a very low number of graduates who choose to specialize in fields of primary health care. Extremely low rates are mainly in the fields of general practical medicine and the practical medicine for children and adolescents, which may be largely due to an ambiguous concept of the state politics to define the role of the practitioner. As for the mechanical movement of doctors, based on available data, we can say that so far there has been no outflow of physicians in primary health care for abroad. On the other hand, there is no significant influx of new doctors from abroad into the fields of primary care.
- Estimation of the future development of structures and physicians indicates quite big problems that affect each area of primary health care in the next 15–20 years, especially in the fields of general practical medicine and the practical medicine for children and youth. Despite the expected increases of the number of new physicians in the fields of primary health care, there will be a significant reduction in the number of doctors. To avoid a substantial impact on the availability and quality of health care, it will be necessary to persuade physicians to practise their profession in their seniors-ages, even in the far greater extent than today.

On the basis of the main results of the work, there could be defined some recommendations how to start solving the problem of the demographic ageing of physicians in (not only) primary health care:

- Create such conditions that would sufficiently encourage medical school graduates to further specialize in the fields of primary health care.
- Sufficiently motivate current doctors to practise their professions even at higher age, if their health status allows – regardless of whether they are in retirement or not.
- Create long-term concept of education and training of physicians in primary health care as a crucial sphere of the health sector. Individual steps, such as increasing the number of students/graduates, should be gradual in order to avoid similar problems, as we are witnessing today, in the coming years.

Creating an integrated approach to solve this issue requires the access to relevant information and data. Unavailability, as well as inconsistency of the data, significantly impedes the overall comprehensive analysis of the current state of the problem. It is necessary to significantly increase the attention to both the integrity of the needed data of doctors (not just primary health care), but also to the possibility of their interconnection across different institutions. Ideally, such a way of coordinating data resources could lead to the interconnection of data from the Register of Physicians, Dentists and Pharmacists, administered by IHIS CR, with other sources, which are databases of professional chambers and health insurance databases, but also such data that are recorded by Institute for Information on Education and Institute for Postgraduate Education in Health Service.

Regarding the possible future direction of research in this area, it is necessary to solve this problem comprehensively by involving experts across all branches, not separately. It is not within the power of individuals and several experts from a field, to capture the studied issue well and in detail. This offers an opportunity to create an expert team composed of experts from the public health care, education and demography, as well as from representatives of various professional organizations, involved ministries and health insurance companies. The result of the operation of such a team would be to create a conceptual plan to deal with the issue of the possible future development of the number of doctors in different areas of health care. In addition, it can be assumed that such a concept could become one of the pillars of the Czech healthcare reform, which has started in this period.